Trend Study 9-24-05

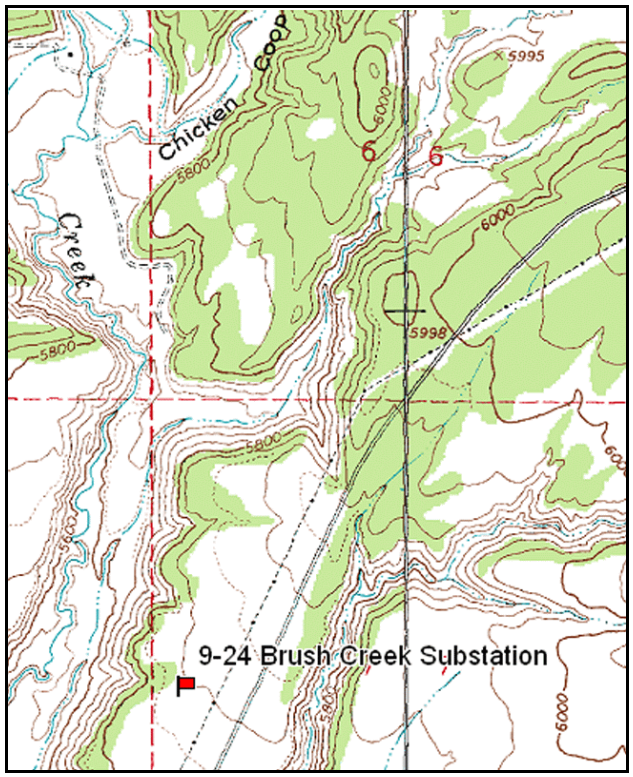
Study site name: Brush Creek Substation . Vegetation type: Wyoming Big Sagebrush .

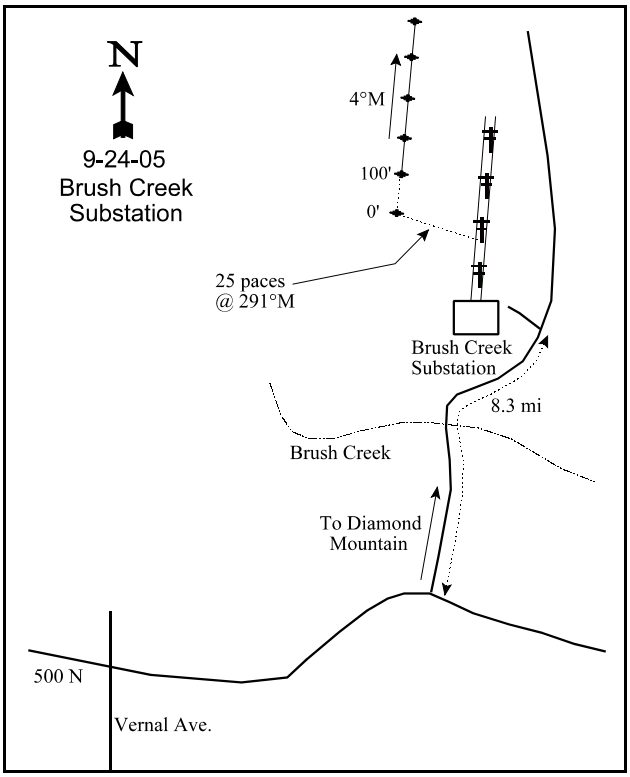
Compass bearing: frequency baseline 4 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From the intersection of Vernal Avenue and 500 North in Vernal, head east on 500 North. Turn north on the road that leads to Diamond Mountain. Drive 8.3 miles to a short road on the left that leads to the Brush Creek Substation. Turn north and follow the power lines to the second set of power poles to power pole number 28/4. From the western most pole walk 25 paces at 291°M to the 0' stake with browse tag number 61. The study is marked with green, steel fence posts approximately 12-18 inches in height.





Map Name: Donkey Flat

Diagrammatic Sketch

Township 3S , Range 23E ,Section 7

GPS: NAD 27, UTM 12T 4492533 N, 636768 E

DISCUSSION

Brush Creek Substation - Trend Study No. 9-24

The Brush Creek Substation trend study was established in 1997 and samples a Wyoming big sagebrush community. The land is managed by the BLM and is within the SJ Hatch grazing allotment. This area is an important winter range for mule deer. The site has an elevation of 5,850 feet and a southern aspect with a slight slope of 1-2%. Pellet group data from 1997 estimated 154 deer, 12 elk, and 2 cow days use/acre (380 ddu/ha, 30 edu/ha, and 5 cdu/ha). Pellet group data from 2005 estimated 45 deer, 1 elk, and 6 cows days use/acre (111 ddu/ja, 2 edu/ha, and 14 cdu/ha).

Soils have a sandy loam texture with a moderately shallow effective rooting depth of 13 inches. Soil pH was slightly alkaline at 7.9. The soil phosphorus was 8.4, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). The ratio of protective cover (vegetation, litter, and cryptograms) to bare ground is moderately low at 2.3 to 1. Bare soil is fairly high in the shrub interspaces where some erosion is noticeable. Soil and litter movement was apparent with slight pedestalling of the shrubs. The erosion condition class determined soil movement as stable in 2005.

Wyoming big sagebrush is the dominant key browse. Sagebrush cover in 1997 was estimated at 16%, but decreased to only 2.5% by 2005. This change in trend for sagebrush was observed on several sites in this region. Sagebrush density was estimated at 8,240 plants/acre in 1997, which decreased to only 1,280 plants/acre by 2005. In 1997, 16% of the population was classified as decadent. That has now increased to 84% in 2005. Furthermore, 69% of population was classified as dying. Young recruitment was minimal, although seedlings were very abundant in 2005. Seedling establishment will depend on cheatgrass cover and its ability to compete for the limited resources (Hall et al. 1999). Utilization on sagebrush was classified as moderate to heavily.

The herbaceous understory in 1997 was dominated by cheatgrass, but in 2005 many more forbs were present in the area. Cheatgrass averaged 3.5% cover in both 1997 and 2005, although nested frequency decreased significantly in 2005. Overall abundance can be illustrated by quadrat frequency, 79% in 1997 and 50% in 2005 where cover for both sampling periods was about the same. Only three perennial grasses were observed, all with less than 1% cover. These include squirreltail, Indian ricegrass, and needle-and-thread. Sum of nested frequency for perennial grasses was low in 1997, but decreased by almost 80% by 2005. Both annual and perennial forbs increased significantly with above normal precipitation in 2005. Cover for perennial and annual forbs increased from less than 1% in 1997 to 34% in 2005. Annual forb cover was almost nonexistent in 1997, but by 2005 cover was estimated at 11%. Perennial forbs contributed to less than 1% cover in 1997 and it increased to 23%. Scarlet globemallow was the dominant forb with 14% cover. Other dominate forbs included: timber poison milkvetch, tanseymustard, annual stickseed, purple aster, and Russian thistle. Most of these species are considered weedy.

1997 APPARENT TREND ASSESSMENT

Bare soil is fairly high in the interspaces of the shrubs. The ratio of protective cover to bare ground is moderately low at 2.5:1. Key browse Wyoming big sagebrush had an average cover of 16% and density estimated 8,240 plants/acre. Percent decadence is moderately low at 16%. Utilization is moderate to heavy hedging, but vigor remains fairly good. Herbaceous understory is dominated mostly by cheatgrass with a small population of squirreltail. Forbs are rare and provide less than 1% cover. The Desirable Components Index rated this site as fair with a score of 36 due to good browse cover, low decadency, but poor perennial grass and forb cover.

winter range condition (DC Index) - Fair (36) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soils is stable. Vegetation increased this year which will help protect soil from erosion. Bare ground and cryptograms decreased as a result of increase vegetation. The ratio of protective cover to bare ground is moderately low at 2.3:1 and the main difference from 1997 was the reduction in cryptogram nested frequency. Trend for key browse Wyoming big sagebrush is down. Density decreased from 8,240 plants/acre in 1997 to 1,280 in 2005. Eighty-four percent of the surviving population was classified as decadent. To further illustrate the quickly deteriorating problem on this site, 69% of the population were classified as dying. Young recruitment in minimal, although seedlings were very abundant this year. Their survival is doubtful. Trend for the herbaceous understory is slightly down. Perennial grasses are few to nonexistent and they decreased significantly in 2005. Cheatgrass decreased significantly in nested frequency, but cover remains the same. Forbs increased dramatically, but most are weedy species such as halogeton, Russian thistle, annual stickseed, and tansey mustard. Scarlet globemallow is the most abundant species and is keeping this trend from being down. Unfortunately, the forb component is of less importance on this site than the grasses. The Desirable Components Index rated this site as very poor with a score of 4 due to poor browse cover, high decadency, poor young recruitment, and poor perennial grass cover.

TREND ASSESSMENT
soil - stable (0)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - Very Poor (4) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 09 , Study no: 24

Type	Species	Nested Frequency		Average Cover %	
		'97	'05	'97	'05
G	Bromus tectorum (a)	$_{b}$292	$_{a}$139	3.46	3.54
G	Oryzopsis hymenoides	-	5	-	.04
G	Sitanion hystrix	$_{b}$146	$_{a}$23	.92	.45
G	Stipa comata	3	3	.03	.02
Total for Annual Grasses		292	139	3.46	3.54
Total for Perennial Grasses		149	31	0.95	0.51
Total for Grasses		441	170	4.41	4.06
F	Agoseris glauca	-	1	-	.03
F	Alyssum alyssoides (a)	$_{a}$6	$_{b}$48	.02	.91
F	Arabis sp.	1	-	.00	-
F	Astragalus convallarius	28	46	.19	3.50
F	Chenopodium leptophyllum(a)	8	2	.01	.01
F	Chaenactis stevioides	$_{a}$-	$_{b}$18	-	.42
F	Collinsia parviflora (a)	$_{a}$-	$_{b}$27	-	.19
F	Cryptantha sp.	$_{b}$15	$_{a}$1	.03	.00
F	Descurainia pinnata (a)	$_{a}$-	$_{b}$147	-	3.15

Type	Species	Nested Frequency '97	Nested Frequency '05	Average Cover % '97	Average Cover % '05
F	Eriogonum cernuum (a)	$_{a}$1	$_{b}$33	.00	.45
F	Eriogonum racemosum	2	-	.06	.00
F	Gilia sp. (a)	$_{a}$-	$_{b}$37	-	.74
F	Halogeton glomeratus (a)	$_{a}$-	$_{b}$51	-	.48
F	Lappula occidentalis (a)	$_{a}$14	$_{b}$134	.03	2.14
F	Lactuca serriola	$_{a}$-	$_{b}$24	-	.34
F	Machaeranthera canescens	$_{a}$28	$_{b}$116	.07	3.91
F	Navarretia intertexta (a)	$_{a}$-	$_{b}$17	-	.35
F	Phlox longifolia	13	9	.03	.04
F	Plantago patagonica (a)	-	6	-	.03
F	Salsola iberica (a)	$_{a}$-	$_{b}$124	-	2.22
F	Sisymbrium altissimum (a)	-	10	-	.38
F	Sphaeralcea coccinea	$_{a}$42	$_{b}$195	.13	13.68
F	Townsendia sp.	$_{a}$-	$_{b}$41	-	.59
Total for Annual Forbs		29	636	0.06	11.09
Total for Perennial Forbs		129	451	0.53	22.55
Total for Forbs		158	1087	0.59	33.64

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 09 , Study no: 24

Type	Species	Strip Frequency '97	Strip Frequency '05	Average Cover % '97	Average Cover % '05
B	Artemisia tridentata wyomingensis	100	34	16.13	2.45
B	Opuntia sp.	9	12	.03	.33
Total for Browse		109	46	16.17	2.78

CANOPY COVER, LINE INTERCEPT --
Management unit 09 , Study no: 24

Species	Percent Cover '05
Artemisia tridentata wyomingensis	3.34

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 09 , Study no: 24

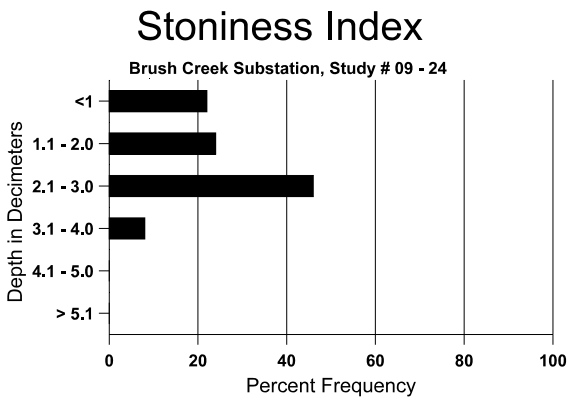
Species	Average leader growth (in) '05
Artemisia tridentata wyomingensis	2.3

BASIC COVER --
Management unit 09 , Study no: 24

Cover Type	Average Cover % '97	'05
Vegetation	18.79	35.26
Rock	.46	.35
Pavement	4.31	1.76
Litter	22.62	33.88
Cryptogams	5.05	1.14
Bare Ground	44.67	38.60

SOIL ANALYSIS DATA --
Herd Unit 09, Study # 24, Study Name: Brush Creek Substation

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
13.3	68.7 (12.6)	7.6	57.4	22.1	20.6	1.4	8.4	67.2	0.4



PELLET GROUP DATA --
Management unit 09 , Study no: 24

Type	Quadrat Frequency '97	Quadrat Frequency '05	Days use per acre (ha) '05
Rabbit	9	26	-
Elk	16	1	1 (2)
Deer	61	46	45 (111)
Cattle	-	-	6 (14)

BROWSE CHARACTERISTICS --
Management unit 09 , Study no: 24

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
97	**8240**	-	200	6740	1300	1460	56	42	16	7	12	14/25
05	**1280**	1740	60	140	1080	8160	36	61	84	69	69	13/18
Opuntia sp.												
97	**180**	-	-	160	20	-	0	0	11	11	11	4/11
05	**260**	-	-	160	100	-	0	0	38	23	23	4/14